REMARKS

The Office Action mailed May 29, 2002, has been received and reviewed. Claims 1 through 26 are currently pending in the application. Claims 1 through 22 and 24 stand rejected. Claims 23, 25, and 26 have been objected to as being dependent upon rejected base claims. The indication of allowable subject matter in such claims is noted with appreciation.

Per this response, Applicants have amended claims 1, 4, 11, 14, 15, 21, 23, 25 and 26 and respectfully request reconsideration of the application as amended herein.

35 U.S.C. § 112 Claim Rejections

Claims 1 through 20 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Specifically, the Examiner notes that claims 1, 4 and 15 fail to list a component under "b)" (the second listed element) to which the cited range applies; claim 4 lacks sufficient antecedent basis for the limitation "the ferrite content" in line 8; claim 5 lacks antecedent basis for the limitation "the chromium" in line 2; claim 15 lacks sufficient antecedent basis for the limitation "the hot forming range" in line 9; and claim 17 lacks sufficient antecedent basis for the limitation "the chromium" in line 1.

Applicants have amended claims 1, 4 and 15 herein. Specifically, Applicant has corrected a clerical error that resulted in the term "chromium" being omitted from claims 1, 4, and 15. Further, the amendments to claims 1, 4 and 15 are believed to alleviate any perceived lack of antecedent basis.

Applicants, therefore, submit that claims 1 through 20 comply with the requirements of 35 U.S.C. § 112, second paragraph and respectfully request reconsideration thereof.

35 U.S.C. § 102(b) Anticipation Rejections

Anticipation Rejection Based on U.S. Patent No. 4,592,890 to Burnett et al. and the Metals Handbook, 9th Edition

Claims 1 and 2 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Burnett et al. (U.S. Patent No. 4,592,890) and the *Metals Handbook, 9th Edition*. Applicants traverse this rejection as hereinafter set forth.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Brothers v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). The identical invention must be shown in as complete detail as is contained in the claim. *Richardson v. Suzuki Motor Co.*, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989).

Claim 1, as amended herein, is directed to a gadolinium-containing metal alloy for neutron absorption *consisting essentially* of: gadolinium from greater than 0.1% to 10% by weight; chromium at from about 13% to 18.5% by weight; molybdenum at from about 1.5% to 16% by weight; manganese at from residual amounts to about 3% by weight; nickel at from about 10% to 85% by weight; residual amounts of phosphorus, sulfur, silicon, carbon, and nitrogen; a ferrite content of less than 5% by weight; and a balance of material substantially comprising iron.

The Examiner cites Burnett as teaching a nickel dental casting alloy with a composition by weight of: 78-84% Ni, 0-3% Gd, 11-15% Cr, 0-7% Mo, 0-3% MN, 0-0.8% C, 0-3% Si. Further, the Examiner states that residual amounts of Mn, P, S and N would be inherent in such a nickel composition (citing the *Metals Handbook, 9th Edition*).

Applicants note, however, that Burnett also teaches the composition to include extraneous elements including about 3-5% vanadium (V), about 1-2% beryllium (Be), and 0-3% of any of aluminum (Al), tin (Sn), lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd) or

samarium (Sm), 0-7% of niobium (Nb), tungsten (W), and titanium (Ti), and 0-1% boron (B). (Col. 1, lines 47-60).

Applicants, therefore, submit that Burnett fails to teach a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Burnett would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 1 is allowable over Burnett and respectfully request reconsideration and allowance thereof. Applicants further submit that claim 2 is allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Anticipation Rejection Based on U.S. Patent No. 4,210,447 to Tsai and the Metals Handbook, 9th Edition

Claims 1 and 2 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Tsai (U.S. Patent No. 4,210,447) and the *Metals Handbook, 9th Edition*. Applicants respectfully traverse this rejection as hereinafter set forth.

As set forth above, claim 1, as amended herein, is directed to a gadolinium-containing metal alloy for neutron absorption *consisting essentially of* the recited composition.

The Examiner cites Tsai as teaching an alloy used for dental resotoration having a composition which includes 58-58% Ni, 0.01-5% Gd, 18-23% Cr, 10% Mo, 0.01-0.5% Si, 0.01-0.1% C, and 0.01-0.4% Mn. Further, the Examiner states that residual amounts of Mn, P, S and N would be inherent in such a nickel composition (citing the *Metals Handbook, 9th Edition*).

Applicants note, however, that Tsai teaches the composition to include various levels of extraneous elements such as tantalum, columbium, titanium and aluminum. (Col. 2, line 64-68). More specifically, the only example given which uses gadolinium is Example 6 (see second table of col. 4) which also includes 3.71% by weight of columbium + tantalum, o.13% aluminum and 0.09% titanium.

Applicants, therefore, submit that Tsai fails to teach a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Tsai would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

Furthermore, example 6, the only specific composition taught by Tsai to contain gadolinium, includes 21.22% chromium which exceeds the cited range of claim 1 of the presently claimed invention.

As such, Applicants submit that claim 1 is allowable over Tsai and respectfully request reconsideration and allowance thereof. Applicants further submit that claim 2 is allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Anticipation Rejection Based on Japanese Patent No. JP 06192792 to Kajimura et al. and the Metals Handbook, 10th Edition

Claims 1 and 3 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kajimura et al. (Japanese Patent No. JP 06192792) and the *Metals Handbook, 10th Edition*. Applicants respectfully traverse this rejection as hereinafter set forth.

As set forth above, claim 1, as amended herein, is directed to a gadolinium-containing metal alloy for neutron absorption *consisting essentially of* the recited composition.

The Examiner cites Kajimura as teaching a stainless steel having high neutron absorption capacity with the a composition by weight of: 0.05-1.0% Gd, 18-26% Cr, 0.1-5% Mo, , up to 2% Mn, 10-22% Ni, up to 0.5% Si, up to 0,02% C and balance Fe with impurities. The Examiner further states that it is inherent that P, S, and N would be present in the steel as impurities (citing the *Metals Handbook, 10th Edition*).

Applicants note, however, that Kajimura explicitly teaches the composition to be a "boron-containing stainless steel" and, as such, it includes 3.0% boron. Additionally, Kajimura teaches that the composition may include 0.1-5%, independently or in total, of one or more

elements among titanium, zirconium and niobium; and 1% each of one or more elements among cadmium, samarium and europium and/or 0.1-5%, independently or in total, of one or more elements among molybdenum, tungsten and vanadium.

Applicants, therefore, submit that Kajimura fails to teach a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Kajimura would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 1 is allowable over Kajimura and respectfully request reconsideration and allowance thereof. Applicants further submit that claim 3 is allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Anticipation Rejection Based on Japanese Patent No. JP 62056557 to Fujiwara et al.

Claims 1 and 3 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Fujiwara et al. (Japanese Patent No. JP 62056557). Applicants respectfully traverse this rejection as hereinafter set forth.

As set forth above, claim 1, as amended herein, is directed to a gadolinium-containing metal alloy for neutron absorption *consisting essentially of* the recited composition.

The Examiner cites Fujiwara as teaching a stainless steel for neutron-absorption having a composition by weight of: 0.1-3% Gd, 15-20% Cr, up to 5% Mo, up to 2% Mn, 7-35% Ni, up to P, up to 0.03% S, up to 1.5% Si, 0.1-0.15% C, and up to 0.3% N.

Applicants note, however, that Fujiwara teaches that the composition also includes up to 1% titanium and up to 2% niobium. Further, Fujiwara teaches that the composition may additionally contain up to 0.1% cobalt.

Applicants, therefore, submit that Fujiwara fails to teach a composition which consists *essentially of* those components set forth in claim 1 of the presently claimed invention as the

addition of the above recited elements taught by Fujiwara would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 1 is allowable over Fujiwara and respectfully request reconsideration and allowance thereof. Applicants further submit that claim 3 is allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Anticipation Rejection Based on Japanese Patent No. JP 06192792 to Kajimura and the Metals Handbook, 10th Edition

Claims 4 through 8 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Kajimura (Japanese Patent No. JP 06192792) and the *Metals Handbook, 10th Edition*. Applicants respectfully traverse this rejection as hereinafter set forth.

Claim 4, as amended herein, is directed to a stainless steel alloy *consisting essentially* of: gadolinium at from about 0.1% to 4% by weight; chromium at from about 13% to 18.5% by weight; molybdenum at from about 1.5% to 4% by weight; manganese at from about 1% to 3% by weight; nickel at from about 10% to 23% by weight; residual amounts of phosphorus, sulfur, silicon, carbon, and nitrogen; and a balance of material substantially comprising iron, wherein the ferrite content of the alloy is less than 5% by weight.

The Examiner cites Kajimura as teaching a stainless steel having high neutron absorption capacity with a composition by weight of: 0.05-1.0% Gd, 18-26% Cr, 0.1-5% Mo, , up to 2% Mn, 10-22% Ni, up to 0.5% Si, up to 0,02% C and balance Fe with impurities. The Examiner further states that it is inherent that P, S, and N would be present in the steel as impurities (citing the *Metals Handbook, 10th Edition*).

Applicants note, however, that Kajimura explicitly teaches the composition to be a "boron-containing stainless steel" and, as such, it includes 3.0% boron. Additionally, Kajimura teaches that the composition may include 0.1-5%, independently or in total, of one or more elements among titanium, zirconium and niobium; and 1% each of one or more elements among

cadmium, samarium and europium and/or 0.1-5%, independently or in total, of one or more elements among molybdenum, tungsten and vanadium.

Applicants, therefore, submit that Kajimura fails to teach a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Kajimura would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 4 is allowable over Kajimura and respectfully request reconsideration and allowance thereof. Applicants further submit that claims 5 through 8 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Anticipation Rejection Based on U.S. Patent No. 4,592,890 to Burnett et al. and the Metals Handbook, 9th Edition

Claims 21, 22, and 24 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Burnett et al. (U.S. Patent No. 4,592,890) and the *Metals Handbook, 9th Edition*. Applicants respectfully traverse this rejection as hereinafter set forth.

Claim 21, as amended herein, is directed to a nickel-based alloy *consisting essentially of*: gadolinium at from about 0.1% to 10% by weight; chromium at from about 13% to 24% by weight; molybdenum at from about 1.5% to 16% by weight; iron at from about 0.01 to 6% by weight; residual amounts of manganese, phosphorus, sulfur, silicon, carbon, and nitrogen; a balance of material substantially comprising nickel wherein the nickel is present at greater than 50% by weight.

The Examiner cites Burnett as teaching a nickel dental casting alloy with a composition by weight of: 78-84% Ni, 0-3% Gd, 11-15% Cr, 0-7% Mo, 0-3% MN, 0-0.8% C, 0-3% Si. Further, the Examiner states that residual amounts of Mn, P, S and N would be inherent in such a nickel composition (citing the *Metals Handbook, 9th Edition*).

As noted above, however, Burnett also teaches the composition to include extraneous elements including about 3-5% vanadium (V), about 1-2% beryllium (Be), and 0-3% of any of aluminum (Al), tin (Sn), lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd) or samarium (Sm), 0-7% of niobium (Nb), tungsten (W), and titanium (Ti), and 0-1% boron (B). (Col. 1, lines 47-60).

Applicants, therefore, submit that Burnett fails to teach a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Burnett would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 21 is allowable over Burnett and respectfully request reconsideration and allowance thereof. Applicants further submit that claims 22 and 24 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Anticipation Rejection Based on U.S. Patent No. 4,210,447 to Tsai and the Metals Handbook, 9th Edition

Claims 21, 22, and 24 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Tsai (U.S. Patent No. 4,210,447) and the *Metals Handbook, 9th Edition*. Applicants have amended independent claim 21, as hereinafter set forth.

Claim 21, as amended herein, is directed to a nickel-based alloy *consisting essentially of*: gadolinium at from about 0.1% to 10% by weight; chromium at from about 13% to 24% by weight; molybdenum at from about 1.5% to 16% by weight; iron at from about 0.01 to 6% by weight; residual amounts of manganese, phosphorus, sulfur, silicon, carbon, and nitrogen; a balance of material substantially comprising nickel wherein the nickel is present at greater than 50% by weight.

The Examiner cites Tsai as teaching an alloy used for dental resotoration having a composition which includes 58-58% Ni, 0.01-5% Gd, 18-23% Cr, 10% Mo, 0.01-0.5% Si, 0.01-0.1% C, and 0.01-0.4% Mn. Further, the Examiner states that residual amounts of MN, P, S and N would be inherent in such a nickel composition (citing the *Metals Handbook, 9th Edition*).

As noted above, however, Tsai teaches the composition to include various levels of extraneous elements such as tantalum, columbium, titanium and aluminum. (Col. 2, line 64-68). More specifically, the only example given which uses gadolinium is Example 6 (see second table of col. 4) which also includes 3.71% by weight of columbium + tantalum, .13% aluminum and 0.09% titanium.

Applicants, therefore, submit that Tsai fails to teach a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Tsai would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 1 is allowable over Tsai and respectfully request reconsideration and allowance thereof. Applicants further submit that claims 22 and 24 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 4,592,890 to Burnett et al. and the Metals Handbook, 9th Edition

Claims 1 and 2 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Burnett et al. (U.S. Patent No. 4,592,890) and the *Metals Handbook, 9th Edition*. Applicants respectfully traverse this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references

> themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, **the prior art reference (or references when combined) must teach or suggest all the claim limitations.** The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

Claim 1, as amended herein, is directed to a gadolinium-containing metal alloy for neutron absorption *consisting essentially* of: gadolinium from greater than 0.1% to 10% by weight; chromium at from about 13% to 18.5% by weight; molybdenum at from about 1.5% to 16% by weight; manganese at from residual amounts to about 3% by weight; nickel at from about 10% to 85% by weight; residual amounts of phosphorus, sulfur, silicon, carbon, and nitrogen; a ferrite content of less than 5% by weight; and a balance of material substantially comprising iron.

The Examiner cites Burnett as teaching a nickel dental casting alloy with a composition by weight of: 78-84% Ni, 0-3% Gd, 11-15% Cr, 0-7% Mo, 0-3% MN, 0-0.8% C, 0-3% Si. Further, the Examiner states that residual amounts of Mn, P, S and N would be inherent in such a nickel composition (citing the *Metals Handbook, 9th Edition*).

Applicants note, however, that Burnett also teaches the composition to include extraneous elements including about 3-5% vanadium (V), about 1-2% beryllium (Be), and 0-3% of any of aluminum (Al), tin (Sn), lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd) or samarium (Sm), 0-7% of niobium (Nb), tungsten (W), and titanium (Ti), and 0-1% boron (B). (Col. 1, lines 47-60).

Applicants, therefore, submit that Burnett fails to teach or suggest a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Burnett would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 1 is allowable over Burnett and respectfully request reconsideration and allowance thereof. Applicants further submit that claim 2 is allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Obviousness Rejection Based on Japanese Patent No. JP 06192792 to Kajimura and the Metals Handbook, 10th Edition

Claims 1 and 3 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kajimura (Japanese Patent No. JP 06192792) and the *Metals Handbook, 10th Edition*. Applicants respectfully traverse this rejection as hereinafter set forth.

As set forth above, claim 1, as amended herein, is directed to a gadolinium-containing metal alloy for neutron absorption *consisting essentially of* the recited composition.

The Examiner cites Kajimura as teaching a stainless steel having high neutron absorption capacity with the a composition by weight of: 0.05-1.0% Gd, 18-26% Cr, 0.1-5% Mo, , up to 2% Mn, 10-22% Ni, up to 0.5% Si, up to 0,02% C and balance Fe with impurities. The Examiner further states that it is inherent that P, S, and N would be present in the steel as impurities (citing the *Metals Handbook, 10th Edition*).

Applicants note, however, that Kajimura explicitly teaches the composition to be a "boron-containing stainless steel" and as such includes 3.0% boron. Additionally, Kajimura teaches that the composition may include 0.1-5%, independently or in total, of one or more elements among titanium, zirconium and niobium; and 1% each of one or more elements among cadmium, samarium and europium and/or 0.1-5%, independently or in total, of one or more elements among molybdenum, tungsten and vanadium.

Applicants, therefore, submit that Kajimura fails to teach or suggest a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Kajimura would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 1 is allowable over Kajimura and respectfully request reconsideration and allowance thereof. Applicants further submit that claim 3 is allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Obviousness Rejection Based on Japanese Patent No. JP 62056557 to Fujiwara et al.

Claims 1 and 3 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujiwara et al. (Japanese Patent No. JP 62056557). Applicants respectfully traverse this rejection as hereinafter set forth.

As set forth above, claim 1, as amended herein, is directed to a gadolinium-containing metal alloy for neutron absorption *consisting essentially of* the recited composition.

The Examiner cites Fujiwara as teaching a stainless steel for neutron-absorption having a composition by weight of: 0.1-3% Gd, 15-20% Cr, up to 5% Mo, up to 2% Mn, 7-35% Ni, up to P, up to 0.03% S, up to 1.5% Si, 0.1-0.15% C, and up to 0.3% N.

Applicants note, however, that Fujiwara teaches that the composition also includes up to 1% titanium and up to 2% niobium. Further, Fujiwara teaches that the composition may additionally contain up to 0.1% cobalt.

Applicants, therefore, submit that Fujiwara fails to teach or suggest a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Fujiwara would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 1 is allowable over Fujiwara and respectfully request reconsideration and allowance thereof. Applicants further submit that claim 3 is allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Obviousness Rejection Based on Japanese Patent No. JP 06192792 to Kajimura and the Metals Handbook, 10th Edition

Claims 4 through 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kajimura (Japanese Patent No. JP 06192792) and the *Metals Handbook, 10th Edition.* Applicants respectfully traverse this rejection as hereinafter set forth.

Claim 4, as amended herein, is directed to a stainless steel alloy *consisting essentially* of: gadolinium at from about 0.1% to 4% by weight; chromium at from about 13% to 18.5% by weight; molybdenum at from about 1.5% to 4% by weight; manganese at from about 1% to 3% by weight; nickel at from about 10% to 23% by weight; residual amounts of phosphorus, sulfur, silicon, carbon, and nitrogen; and a balance of material substantially comprising iron, wherein the ferrite content of the alloy is less than 5% by weight.

The Examiner cites Kajimura as teaching a stainless steel having high neutron absorption capacity with a composition by weight of : 0.05-1.0% Gd, 18-26% Cr, 0.1-5% Mo, , up to 2% Mn, 10-22% Ni, up to 0.5% Si, up to 0,02% C and balance Fe with impurities. The Examiner further states that it is inherent that P, S, and N would be present in the steel as impurities (citing the *Metals Handbook, 10th Edition*).

Applicants note, however, that Kajimura explicitly teaches the composition to be a "boron-containing stainless steel" and, as such, it includes 3.0% boron. Additionally, Kajimura teaches that the composition may include 0.1-5%, independently or in total, of one or more elements among titanium, zirconium and niobium; and 1% each of one or more elements among cadmium, samarium and europium and/or 0.1-5%, independently or in total, of one or more elements among molybdenum, tungsten and vanadium.

Applicants, therefore, submit that Kajimura fails to teach a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Kajimura would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 4 is allowable over Kajimura and respectfully request reconsideration and allowance thereof. Applicants further submit that claims 5 through 8 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Obviousness Rejection Based on Japanese Patent No. JP 62056557 to Fujiwara et al. and the Metals Handbook, 10th Edition

Claims 4 through 8 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujiwara et al. (Japanese Patent No. JP 62056557) and the *Metals Handbook, 10th Edition.* Applicants respectfully traverse this rejection as hereinafter set forth.

Claim 4, as amended herein, is directed to a stainless steel alloy *consisting essentially* of the recited composition.

The Examiner cites Fujiwara as teaching a stainless steel for neutron-absorption having a composition by weight of: 0.1-3% Gd, 15-20% Cr, up to 5% Mo, up to 2% Mn, 7-35% Ni, up to P, up to 0.03% S, up to 1.5% Si, 0.1-0.15% C, and up to 0.3% N.

Applicants note, however, that Fujiwara teaches that the composition also includes up to 1% titanium and up to 2% niobium. Further, Fujiwara teaches that the composition may additionally contain up to 0.1% cobalt.

Applicants, therefore, submit that Fujiwara fails to teach or suggest a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Fujiwara would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 1 is allowable over Fujiwara and respectfully request reconsideration and allowance thereof. Applicants further submit that claims 5 through 8 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Obviousness Rejection Based on Japanese Patent No. JP 06192792 to Kajimura and Further in View of U.S. Patent No. 4,292,528 to Shaffer et al.

Claims 9 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Kajimura (Japanese Patent No. JP 06192792), as applied to Claims 4 through 8 above, and further in view of Shaffer et al. (U.S. Patent No. 4,292,528). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claims 9 and 10 each depend from claim 4. As set forth above, Applicants submit that Kajimura fails to teach or suggest a composition *consisting essentially of* the elements set forth in independent claim 4. Applicants further submit that Shaffer fails to teach or suggest such a composition.

Applicants, therefore, submit that dependent claims 9 and 10 are allowable as being dependent from and allowable base claim and respectfully request reconsideration and allowance thereof.

Obviousness Rejection Based on Japanese Patent No. JP 62056557 to Fujiwara et al. and Further in View of U.S. Patent No. 4,292,528 to Shaffer et al.

Claims 9 and 10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Fujiwara et al. (Japanese Patent No. JP 62056557), as applied to claims 4 through 8 above, and further in view of Shaffer et al. (U.S. Patent No. 4,292,528). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claims 9 and 10 each depend from claim 4. As set forth above, Applicants submit that Fujiwara fails to teach or suggest a composition *consisting essentially of* the elements set forth in independent claim 4. Applicants further submit that Shaffer fails to teach or suggest such a composition.

Applicants, therefore, submit that dependent claims 9 and 10 are allowable as being dependent from and allowable base claim and respectfully request reconsideration and allowance thereof.

Obviousness Rejection Based on U.S. Patent No. 3,362,813 to Ziolkowski in View of U.S. Patent No. 4,010,375 to Wachter and U.S. Patent No. 5,926,516 to Rudnick et al.

Claim 11 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Ziolkowski (U.S. Patent No. 3,362,813) in view of Wachter (U.S. Patent No. 4,010,375) and Rudnick et al. (U.S. Patent No. 5,926,516). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 11 as it presently stands states "A spent nuclear fuel storage system configured for thermal neutron absorption and corrosion resistance comprising: a poisoned member, the member being substantially comprised of a *cast* stainless steel alloy," the alloy comprising the recited composition.

The Examiner cites Ziolkowski as teaching wrought austenitic stainless steel alloy used for neutron absorption with the following composition by weight: 0.2-3% Gd, 2-26% Cr, up to 4% Mo, up to 10% Mn, 3.5-22% Ni, 5-25% ferrite, up to 1% P and S, up to 0.25% C, up to 2% Si, and up to 0.7% N.

However, Applicants submit that Ziolkowski fails to teach or suggest a *cast* stainless steel alloy configured for a spent nuclear fuel storage system. Rather, Ziolkowski teaches the opposite. Ziolkowski states, "[t]he alloy of the present invention is particularly well suited for use in providing *wrought* products which may be used where parts having a high thermal neutron absorption cross-section are required." (Column 1, Lines 62-70). Thus, Ziolkowski teaches using a *wrought* stainless steel of the above composition for nuclear applications.

Applicants further submit that there is no motivation to modify the wrought stainless steel alloy used in nuclear applications disclosed in Ziolkowski to a cast form because the purpose of the Ziolkowski invention is that by tailoring the ferrite concentration the alloy is hot workable and therefore wrought products can be produced. Ziolkowski states, "[t]he proper balance of the alloying elements in my alloy is highly critical and must be carefully maintained so as to provide a minimum of about 5% ferrite and no more than about 25% ferrite in the as-cast ingot. Unless

this critical balance is maintained the alloy is not hot workable on a commercial scale." (Column 2, Lines 24-29).

Further, Applicants submit that Watcher and Rudnick fail to teach or suggest a *cast* stainless steel alloy configured for a spent nuclear fuel storage system. Rudnick merely teaches that austenitic stainless steels can be used in a fuel assembly storage basin but fails to teach or suggest a cast stainless steel of the composition in claim 11.

Applicant, therefore, submits that claim 11 is allowable over Ziolkowski, Wachter and Rudnick, wither considered individually or in combination, and respectfully request reconsideration and allowance of the same.

Obviousness Rejection Based on U.S. Patent No. 3,362,813 to Ziolkowski in View of U.S. Patent No. 4,010,375 to Wachter and U.S. Patent No. 5,926,516 to Rudnick et al. and Further in View of Shaffer (U.S. Patent No. 4,292,528)

Claims 12 through 14 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Ziolkowski (U.S. Patent No. 3,362,813) in view of Wachter (U.S. Patent No. 4,010,375) and Rudnick et al. (U.S. Patent No. 5,926,516), as applied to Claim 11 above, and further in view of Shaffer (U.S. Patent No. 4,292,528). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claims 12 through 14 depend from claim 11. As set forth above, Applicants submit that Ziolkowski, Wachter and Rudnick fail to teach or suggest a *cast* stainless steel alloy configured for a spent nuclear fuel storage system. Applicants further submit that Shaffer fails to teach such subject matter.

Applicants, therefore, submit that claims 12 through 14 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance thereof.

Obviousness Rejection Based on U.S. Patent No. 4,592,890 to Burnett

Claims 21, 22, and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Burnett (U.S. Patent No. 4,592,890). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 21, as amended herein, is directed to a nickel-based alloy *consisting essentially of*: gadolinium at from about 0.1% to 10% by weight; chromium at from about 13% to 24% by weight; molybdenum at from about 1.5% to 16% by weight; iron at from about 0.01 to 6% by weight; residual amounts of manganese, phosphorus, sulfur, silicon, carbon, and nitrogen; a balance of material substantially comprising nickel wherein the nickel is present at greater than 50% by weight.

The Examiner cites Burnett as teach a nickel dental casting alloy with a composition by weight of: 78-84% Ni, 0-3% Gd, 11-15% Cr, 0-7% Mo, 0-3% MN, 0-0.8% C, 0-3% Si.

As noted above, however, Burnett also teaches that the composition to include extraneous elements including about 3-5% vanadium (V), about 1-2% beryllium (Be), and 0-3% of any of aluminum (Al), tin (Sn), lanthanum (La), cerium (Ce), praseodymium (Pr), neodymium (Nd) or samarium (Sm), 0-7% of niobium (Nb), tungsten (W), and titanium (Ti), and 0-1% boron (B). (Col. 1, lines 47-60).

Applicants, therefore, submit that Burnett fails to teach or suggest a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Burnett would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 21 is allowable over Burnett and respectfully request reconsideration and allowance thereof. Applicants further submit that claims 22 and 24 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

Obviousness Rejection Based on U.S. Patent No. 4,210,447 to Tsai

Claims 21, 22, and 24 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Tsai (U.S. Patent No. 4,210,447). Applicants respectfully traverse this rejection, as hereinafter set forth.

Claim 21, as amended herein, is directed to a nickel-based alloy *consisting essentially of*: gadolinium at from about 0.1% to 10% by weight; chromium at from about 13% to 24% by weight; molybdenum at from about 1.5% to 16% by weight; iron at from about 0.01 to 6% by weight; residual amounts of manganese, phosphorus, sulfur, silicon, carbon, and nitrogen; a balance of material substantially comprising nickel wherein the nickel is present at greater than 50% by weight.

The Examiner cites Tsai as teaching an alloy used for dental resotoration having a composition which includes 58-58% Ni, 0.01-5% Gd, 18-23% Cr, 10% Mo, 0.01-0.5% Si, 0.01-0.1% C, and 0.01-0.4% Mn. Further, the Examiner states that residual amounts of MN, P, S and N would be inherent in such a nickel composition (citing the *Metals Handbook, 9th Edition*).

As noted above, however, Tsai teaches the composition to include various levels of extraneous elements such as tantalum, columbium, titanium and aluminum. (Col. 2, line 64-68). More specifically, the only example given which uses gadolinium is Example 6 (see second table of col. 4) which also includes 3.71% by weight of columbium + tantalum, .13% aluminum and 0.09% titanium.

Applicants, therefore, submit that Tsai fails to teach or suggest a composition which *consists essentially of* those components set forth in claim 1 of the presently claimed invention as the addition of the above recited elements taught by Tsai would surely alter the claimed alloy and its inherent mechanical, chemical and material properties.

As such, Applicants submit that claim 1 is allowable over Tsai and respectfully request reconsideration and allowance thereof. Applicants further submit that claims 22 and 24 are allowable as being dependent from an allowable base claim and respectfully request reconsideration and allowance of the same.

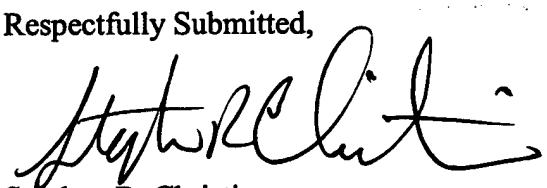
ENTRY OF AMENDMENTS

The amendments to claims 1, 4, 11, 14, 15, and 21 above should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application. Further, the amendments do not raise new issues or require a further search.

CONCLUSION

Claims 1-26 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicants' undersigned attorney.

Respectfully Submitted,



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Date: _____
Enclosure: Version With Markings to Show Changes Made

VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (Amended) A gadolinium-containing metal alloy for neutron absorption [comprising] consisting essentially of:

[a)] gadolinium at from about 0.1% to 10% by weight;

[b)] chromium at from about 13% to 18.5% by weight;

[c)] molybdenum at from about 1.5% to 16% by weight;

[d)] manganese at from residual amounts to about 3% by weight;

[e)] nickel at from about 10% to 85% by weight;

[f)] residual amounts of phosphorus, sulfur, silicon, carbon, and nitrogen;

[g)] a ferrite content of less than 5% by weight; and

[h)] a balance of material substantially comprising iron[, and wherein the alloy is formulated to prevent liquidation of gadolinium-containing compounds and cracking at temperatures from about 800°C to 1200°C].

4. (Amended) A [wrought austenitic] stainless steel alloy [comprising] consisting essentially of:

[a)] gadolinium at from about 0.1% to 4% by weight;

[b)] chromium at from about 13% to 18.5% by weight;

[c)] molybdenum at from about 1.5% to 4% by weight;

[d)] manganese at from about 1% to 3% by weight;

[e)] nickel at from about 10% to 23% by weight;

[f)] residual amounts of phosphorus, sulfur, silicon, carbon, and nitrogen; and

[g)] a balance of material substantially comprising iron, wherein the ferrite content of the alloy is less than 5% by weight[, and wherein the hot forming range is within from about 800°C to 1000°C].

11. (Amended) A spent nuclear fuel storage system configured for thermal neutron absorption and corrosion resistance comprising:

a poisoned member, [said] the poisoned member being substantially comprised of a cast [austenitic] stainless steel alloy, [said] the alloy comprising:

[a)] gadolinium at from about 0.1% to 4% by weight;

[b)] chromium at from about 13% to 25% by weight;

[c)] molybdenum at from about 1.5% to 4% by weight;

[d)] manganese at from about 1% to 3% by weight;

[e)] nickel at from about 10% to 25% by weight;

[f)] residual amounts of phosphorus, sulfur, silicon, carbon, and nitrogen; and

[g)] a balance of material substantially comprising iron[, and wherein the a ferrite content is from 2% to 25% by weight].

14. A system as in claim 11 further comprising a second poisoned member having the composition of the cast stainless steel alloy [described from a) to g)], and wherein the poisoned member is an internal and the second poisoned member is a canister.

15. A [wrought] nickel-based alloy comprising:

[a)] gadolinium at from about 0.1% to 10% by weight;

[b)] chromium at from about 13% to 24% by weight;

[c)] molybdenum at from about 1.5% to 16% by weight;

[d)] iron at from about 0.01% to 6% by weight;

[e)] residual amounts of manganese, phosphorus, sulfur, silicon, carbon, and nitrogen; [and]

[f)] a balance of material substantially comprising nickel [wherein the nickel is present at greater than 50% by weight and the hot forming range is from about 800°C to 1200°C]; and

the nickel-based alloy being in a wrought state.

21. (Amended) A [cast] nickel-based alloy [comprising] consisting essentially of:

[a)] gadolinium at from about 0.1% to 10% by weight;

[b)] chromium at from about 13% to 24% by weight;

[c)] molybdenum at from about 1.5% to 16% by weight;

[d)] iron at from about 0.01 to 6% by weight;

[e)] residual amounts of manganese, phosphorus, sulfur, silicon, carbon, and nitrogen; and

[f)] a balance of material substantially comprising nickel wherein the nickel is present at greater than 50% by weight.

23. (Amended) A nickel-based alloy [as in claim 21] comprising:

gadolinium at from about 0.1% to 10% by weight;

chromium at from about 20% to 24% by weight;

molybdenum at from about 14% to 16% by weight;

iron at from about 0.01 to 6% by weight;

residual amounts of manganese, phosphorus, sulfur, silicon, carbon, and nitrogen; and

a balance of material substantially comprising nickel wherein the nickel is present at greater than 50% by weight [wherein the chromium is present at from 20% to 24% by weight, and the molybdenum is present at from about 14% to 16% by weight].

25. (Amended) A nickel-based alloy [as in claim 21] comprising:

gadolinium at from about 0.1% to 10% by weight;

chromium at from about 13% to 24% by weight;

molybdenum at from about 1.5% to 16% by weight;

iron at from about 0.01 to 6% by weight;

residual amounts of manganese, phosphorus, sulfur, silicon, carbon, and nitrogen; and

a balance of material substantially comprising nickel wherein the nickel is present at greater than 50% by weight, wherein the nickel-based alloy is configured as an internal.

26. A nickel-based alloy [as in claim 21] comprising:

gadolinium at from about 0.1% to 10% by weight;

chromium at from about 13% to 24% by weight;

molybdenum at from about 1.5% to 16% by weight;

iron at from about 0.01 to 6% by weight;

residual amounts of manganese, phosphorus, sulfur, silicon, carbon, and nitrogen; and

a balance of material substantially comprising nickel wherein the nickel is present at greater than 50% by weight, wherein the nickel-based alloy is configured as a canister.